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# FINANCIAL LITERACY AND ITS INFLUENCE ON CONSUMERS' INTERNET BANKING BEHAVIOUR

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**Abstract**

This study examines the level and antecedents of financial literacy and investigates its influence on consumers' internet banking behaviour. The focus is on Cyprus, a country that experienced an unprecedented financial crisis in 2013 that caused an enormous shrinkage of the banking sector. Ever since then, banks have been investing in financial innovations, such as internet banking (i-banking), aiming to enhance customer service and efficiency in the age of financial digitalization. Notwithstanding, the results show that financial literacy is yet too low in Cyprus, whereby only 37.33% of the study's survey adults have a good financial knowledge proficiency level. The results indicate that financially literate consumers show a strong preference for frequent use of i-banking, whereby the odds of using i-banking frequently are increased by more than 64% for one standard deviation increase in the respondents' financial knowledge score. The findings highlight the crucial interplay of digital and financial sophistication, and their positive influence on consumers' usage of digital financial services. The evidence from Cyprus also points to policy directions according to which digital financial education programs should be a central element in national financial literacy strategies.

*Keywords:* financial literacy; internet banking; digital literacy; financial education; national strategy.

*JEL-classification:* D14, D91, G21

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"The recent crisis demonstrated the critical importance of financial literacy and good financial decision-making, both for the economic welfare of households and for the soundness and stability of the system as a whole." [1]

**Ben Bernanke,**
Chairman of the Federal Reserve System

"Young people can't afford to make financial mistakes…. [hence] financial education is an important part for their financial empowerment." [2]

**Adele Atkinson,**
Senior Policy Analyst at OECD

# 1. Introduction

In the modern digital era where technology disruption is changing the financial services industry at a rapid pace, consumers are becoming progressively more responsible for making well-informed financial decisions. Today's complex financial markets offer consumers a vast array of digital financial instruments and this requires that they should be equipped with the required knowledge and skill set to evaluate the options and make the best choices to maximize their long-term financial well-being. Nowadays, consumers need to have an ever-increasing financial sophistication to make effective use of products offered through electronic channels and to avoid fraudulent investments and costly mistakes. Internet and mobile technologies enable access to financial solutions without the need of physical banking infrastructure while new, innovative banking products and services are now only available digitally. For example, innovations in the payment services have led to a shift away from cash towards electronic payments, as consumers now benefit from the use of payment cards and internet or mobile banking (i-banking).[3] According to Eurostat data, in 2018 54% of individuals in EU used i-banking from 26% in 2007.

From the demand side, several significant socio-economic trends and demographic shifts in the population are key forces in changing banks' traditional business models. The best example is the millennials who are moving towards digital banking rather than walking into banks' branches. In fact, many traditional banks are already investing in financial innovation and as far as putting self-service points by mobile technology within their physical

[1] Statement provided for the record of a hearing held on 12 April 2011 at the US Senate, Washington DC.
[2] Statement provided at the 2nd Forum for Economic and Social Policy organized by the Cyprus University of Technology at the Central Bank of Cyprus, 2 November 2018.
[3] Internet banking (i-banking) is also known with terms such as online or mobile banking. It offers consumers electronic access to almost every service traditionally available through a local branch. Nowadays, virtually every banking institution has some form of i-banking, available both on desktop versions and through mobile apps.

branches or closing branches in low-income areas. According to the European Banking Federation, the number of branches in EU decreased by 5.6% in 2018, reflecting in this fashion the increasing need for usage of i-banking.

All the above developments call for higher levels of financial literacy. The digital age demands "digitally smart" people equipped with financial literacy for the effective participation in the new economy. However, surveys consistently show that, although there are significant differences across-countries, the level of financial literacy is relatively low even in advanced economies. OECD (2017a) states that fewer than half of the adult population in the G20 countries are financial literate and thus national policies should be oriented towards enhancing financial education. According to the findings of the Standard and Poor's Rating Services Global Financial Literacy Survey (Klapper et al., 2015), financial literacy rates vary widely across the EU with the rates much lower in Southern Europe. Lusardi and Mitchell (2011) find that only about one third of the global population has familiarity with the basic concepts that underlie everyday financial decisions. Given the above empirical evidence, and the changing economic landscape where individuals are becoming more and more responsible for their own financial planning, including retirement, further investigation of the financial literacy levels across EU countries is crucial.

The importance of financial literacy and its positive externalities are substantiated by a growing body of studies which find that it is associated with better financial decision making. Individuals with a higher level of financial literacy are less vulnerable to being exploited or deceived (Campbell et al., 2011; Lusardi and Mitchell, 2011; Deevy et al., 2012; de Bassa Scheresberg, 2013; Balloch et al., 2015; Andreou and Philip, 2018), are less prone to over-indebtedness (Lusardi and Tufano, 2015), are better in retirement planning (Lusardi and Mitchell, 2007; van Rooij et al., 2012), participate more often in financial markets (van Rooij et al., 2011) and have higher returns on savings accounts (Deuflhard et al., 2018). Despite the long list of studies on financial literacy, there is however a notable gap in the literature concerning an in-depth analysis of the relationship between financial literacy and consumers' usage of digital financial services, such as i-banking behaviour.

To fill this void, the study utilizes data from Cyprus using survey responses from 600 adults aged between 25 and 64 years old, where the overwhelming majority holds a bank account. The case of Cyprus is a very interesting one for several reasons. First, the global financial crisis highlighted the lack of financial knowledge among the globe (Klapper et al., 2013). And Cyprus was among those countries that were hit the hardest during the recent

economic and banking crisis in 2013. Against this background and in the wake of the economic turmoil the important question thus arises whether Cypriot consumers have significantly stepped up their efforts to improve their financial literacy levels in line with other leading European countries. This kind of spill over effect is motivated by evidence showing that people are learning through experience, especially when it adversely affects their financial well-being (Lusardi, 2009; OECD, 2009). Second, during the past few years, Cypriot banks have actively propelled their customers to carry out transactions through i-banking platforms. As such, consumers in Cyprus face an ever-increasing need for financial and digital sophistication to make informed financial decisions. Unfortunately, however, recent evidence among students revealed the worrisome issue of inadequate basic financial knowledge in Cyprus (Andreou and Philip, 2018). In general, contrary to the range and depth of studies already conducted in other European countries to measure financial literacy, there has been a very little effort in the case of Cyprus. Thus, further research on measuring financial literacy in Cyprus for the adult population is necessary to better understand and subsequently address the problem, especially because financial illiteracy is detrimental to the long-term well-being of individuals.

The results of this study document that financial knowledge, measured as the average score to six financial literacy related questions, is rather low among Cypriots. Particularly, only 37.33% of the respondents answered correctly at least four questions, which is the minimum target level, with females showing much lower levels of financial knowledge (a gender gap of around 10% is present). This level of financial knowledge brings Cyprus below the OECD countries' average that stands around 62% (OECD, 2016, p. 26) and away from leading countries in the financial literacy domain like Estonia (73%), Finland (70%) and Latvia (68%).[4] Consequently, individuals appear to be ill-equipped to participate in today's complex financial sector. Further, the gender gap of 10% compares unfavorably to the gender gap of 5% across major emerging economies (Hasler and Lusardi, 2017, pp. 5).

Looking into the antecedents of financial literacy, the study's results show that various socio-demographics such as age, income, employment and education (level and subject discipline) play a significant role in explaining respondents' financial knowledge. The results reveal that in fact millennials, individuals aged 39 years old or below, have a higher

[4] The financial knowledge scores of this study cannot be strictly compared with the OECD (2016) evidence due to some dissimilarities in survey questions and designs between the two studies. However, the rather low financial knowledge score achievement of Cyprus can also be conjectured by looking into other international survey evidence (e.g., Demirguc-Kunt et al., 2015).

probability of showing low levels of financial knowledge. This result squares with other recent empirical evidence. For example, Lusardi et al. (2018) show that millennials know little about their student loans and many do not attempt to calculate the payment amounts that will later be associated with the loans they take. Further, Andreou and Philip (2018) show that Cypriot university students, mostly aged 18 to 24, exhibit low levels of financial literacy while most of them fail to effectively manage credit card debt and are more susceptible to financial fraud.

The study reveals that financial knowledge is an important channel of influence on consumers' i-banking behaviour. Financial knowledge is observed to be one of the most significant factors of influence in explaining the usage of i-banking, above various other important socio-demographics, skills and traits. Specifically, a one standard deviation increase in the respondents' average financial knowledge score, increases by approximately 64% the odds of frequently using i-banking. Interestingly, one standard deviation increase in the average score for skills in using information technology, decreases by approximately 41% the odds of rarely (or never) using i-banking. In fact, respondents state as their main reason for rarely (or never) using i-banking the lack of trust in this service, as well as the lack of necessary information technology skills. Particularly, those lacking financial knowledge are also more likely to report lack of information technology skills and lack of banking-specific knowledge as the reason for not using i-banking often. The latter is pointing to the co-existence of financial illiteracy with digital illiteracy, i.e., digital financial illiteracy. Ergo, this calls for remedial policy actions in the context of developing or re-shaping national strategies, emphasising, *inter alia*, the digital financial education domain.

In this regard, the contribution of this paper is twofold: First, it investigates the magnitude of differences in financial literacy in Cyprus. The analysis relies on survey data collected among the wider population of Cyprus. Heretofore, in-depth empirical evidence for the level of financial literacy in Cyprus was extremely scarce. The only exception is the recent study by Andreou and Philip (2018) that measures the level of financial literacy among Cypriot students aged mostly 18-24 and investigates its implications for debt management and avoidance of fraudulent schemes. Conversely, the current study provides the first evidence about the level and antecedents of financial literacy among the adult population (aged 25-64) in Cyprus, and as such it complements previous academic studies. In this vein, it enables local and foreign policymakers (e.g., Central Bank of Cyprus, OECD) to benchmark Cyprus against other countries providing useful information on how to design and coordinate

its initiatives on the European front.

Second, the paper contributes by investigating to what extent consumers' i-banking behaviour is influenced by variations in financial literacy levels. While previous empirical studies (see, for example, Calvet et al., 2007; Klapper et al., 2013; Lussardi and Tufano, 2015) allude to the benefits of financial literacy in terms of making prudent financial decisions, the results of this study highlight that effective usage of digital financial services, powered through financial technologies, requires increased levels of *digital financial literacy*. To the best of our knowledge, this is the first attempt of its kind and can inform policymakers and financial institutions around the world regarding the implications of digital financial literacy, as well as about the importance of digital financial literacy programmes.

Accordingly, the findings of this study have certain implications and provide ample fodder for policy design. In recent years, financial knowledge, especially among youth, has become a priority in the national strategies of many countries. In an era of financial digitalization individuals are economically active citizens from a very young age and thus they constitute a vulnerable group for being target of a financial fraud. Digital financial literacy levels are in fact becoming an increasingly important aspect of education at every level and elevating financial literacy levels has been set as a top priority for policy makers internationally. The OECD/INFE has recently released guidance on Digitalization and Financial Literacy endorsed by the G20 in 2018 which "*provides policy makers with tools to help economies and societies prosper in an increasingly digital and data-driven world*" (OECD, 2018). In this regard, the evidence from Cyprus points to policy directions according to which digital financial education programmes should be a central element in national financial literacy strategies.

The remaining of the paper is structured as follows. Section 2 gives an overview of the Cypriot environment and reviews some recent evidence on financial literacy in Cyprus. Section 3 discusses the design of the research. Section 4 presents the findings and Section 5 draws on conclusions and policy implications.

## 2. Background and previous evidence on financial literacy

The social and economic context in Cyprus is important for selecting this country as a case study and interpreting the survey findings thereafter. Cyprus is one of the smallest countries in the EU with a population of 864.234 but with high education levels. According

to Eurostat data, tertiary education attainment reached a record high of 57.1% in 2018; far above the EU-28 average (40.7%).

The financial sector has played a dominant role in the Cypriot economy. Specifically, according to the Central Bank of Cyprus data, total banking sector assets rose from €50 billion or 340% of GDP at the end of 2005, to about €128 billion or 688% of GDP at the end of the second quarter of 2010. By the end of 2012 and with the banking crisis lurking ahead, total assets had dropped to €105 billion or 540% of GDP. After a period of strong economic growth, Cyprus experienced one major banking crisis in 2013 that was unprecedented in conception and scale and caused a huge meltdown of the economy.[5] Cyprus was the first Eurozone country ever to apply capital controls in March of 2013, with limits on credit card transactions, daily withdrawals and money transfers abroad.

Since the crisis, the Cypriot banking system has undergone considerable transformation leading to an enormous downsizing. For example, according to Central Bank of Cyprus data, at the end of the third quarter 2016, total assets had dropped to €68 billion or 386% of GDP (when loans to Monetary and Financial Institutions are excluded), while this figure dropped below 320% in 2018. Today, according to the European Banking Federation (EBF, 2018), there are 36 authorized credit institutions in Cyprus, consisting of eight local authorized credit institutions, three subsidiaries of foreign banks from EU Member States, two subsidiaries of foreign banks from non-EU countries, six branches of banks from EU Member States, 15 branches of banks from non-EU Member States and two representative offices. As at the end of 2017, there were 458 branches in Cyprus (compared to 542 in 2016) and the number in 2019 dropped well below 400 (EBF, 2018). The most recent development in the banking sector, was the shutting down of the state-owned Cooperative Central Bank in August 2018, which lead to even further reduction in the number of branches offering on the spot retail banking services.

In Cyprus, the penetration of i-banking is steadily increasing the last years although still lagging the EU average; indeed it is one of the lowest shares. According to Eurostat data, in 2018, 38% of individuals between 25 and 65 years old used i-banking compared to 18% in 2008. I-banking is particularly popular among 25 to 34 years old, with 41% using this

[5]According to data from the Cyprus Statistical Service, GDP growth at constant 2005 market prices was 3.9%, 4.5% and 4.9% in 2005, 2006 and 2007, respectively. In 2008, GDP growth exhibited a slow deceleration reaching a growth rate of 3.7% while in 2009 GDP registered a significant contraction of 2.0%. Subsequently, signs of recovery were recorded in 2010 where GDP growth reached 1.4% and in 2011 the economy recorded marginally growth of 0.4%. The growth rate of GDP plunged to -2.4 and -5.9% in 2012 and 2013, respectively.

facility. The use of i-banking tends to increase in line with the education level of the user. While only 5% of individuals 25 to 64 years old with low education level use i-banking, 67% with high education use this service.

Cyprus ranks 22nd out of the 28 EU Member States in the Digital Economy and Society Index (DESI) 2019. In the Human capital dimension, Cyprus ranks 24th among EU-28 countries and is below the EU-28 average. Although Cypriots increasingly go online, basic and advanced digital skills levels remain below the EU-28 average. Overall, the use of internet services in Cyprus is below the EU average. Cypriots are keen to engage in a variety of online activities and they are active internet users, although far below the EU-28 average.

Previous evidence also suggests that Cyprus' overall financial literacy is low. Specifically, in 2010, a survey was conducted by the Cyprus Securities and Exchange Commission (CySEC).[6] It covered individuals over 22 years old and only focused on general knowledge and information issues related to the capital market, investments in securities and investment products. It is worth mentioning that the primary goal of CySEC's investigation was not the quantitative measurements of the financial literacy of the survey participants, but rather identifying the level of awareness and knowledge of participants on matters relating to CySEC's agenda. As such, this survey was not informative and conclusive regarding the country's financial literacy level. Moreover, Cyprus participated in the Standard and Poor's Ratings Services global survey in 2014 reporting the financial literacy levels in Cyprus, along with the global evidence. This survey measured only four fundamental concepts for financial decision-making — basic numeracy, interest compounding, inflation, and risk diversification — to indicate that financial literacy in Cyprus is at low levels. However, the Standard and Poor's global survey does not feature an in-depth investigation of financial literacy in Cyprus because it considers neither its antecedents nor any of its implications on consumer behaviour.

The study by Andreou and Philip (2018) was the first to attempt an in-depth investigation of financial literacy among Cypriots. The survey covered 881 Cypriot university students, aged mostly 18-24, across the five biggest universities in Cyprus. The financial knowledge scale used in the survey measured the understanding of six fundamental concepts for financial decision-making pertaining to interest rates, inflation, risk and diversification. The results of the study revealed that 6.24% of students answered all questions correctly, with

[6] https://www.cysec.gov.cy/CMSPages/GetFile.aspx?guid=7f3988ff-84df-4e06-9670-96fabf044256 (in Greek)

only 36.9% having a good financial knowledge proficiency level (answering correctly at least 4 responses out of 6). Financial knowledge was also seen to have a distinct channel of influence on students' understanding of managing their credit card debt and students' ability to deter themselves from fraudulent investments. However, despite the alarming empirical findings for low literacy levels in the country, an in-depth analysis country specific for the whole population has not been yet conducted. The current study, *inter alia*, is therefore the first attempt to explore the situation in Cyprus.

The recent banking crisis had multiple negative effects, crippled the economy and severely damaged the banking sector in Cyprus. Although there are different views about the relative importance of the contributing factors, it is generally accepted that the banking crisis in Cyprus stemmed from a combination of errors and omissions, risky and improper behaviour by various players (Clerides, 2014). And whilst the financial illiteracy cannot be pointed at as the *raison d'être* for the Cyprus banking crisis, undoubtedly the lack of understanding of essential financial issues and the lack of personal financial responsibility have contributed to some extent to the crisis, a linkage that has also been identified in similar crisis situations in other countries (OECD, 2009). In fact, household debt in Cyprus grew from 80% of GDP in 2003 to about 146% of GDP with the onset of crisis in 2013 showing that individuals in Cyprus shouldered more financial risks than what they could possibly afford. Subsequently, in August 2014 as the average household could not effectively sustain its over-indebtedness, the ratio of non-performing loans climbed to 41% for owner-occupied housing, 49.7% for other property and 60.1% for consumer loans. As such, the financial viability of the households, as well as the stability of the Cyprus financial system was undermined, and the latter remains fragile to this day and continues to render the economy vulnerable (CBC, 2018).

A rather surprising result of the current study, is that more than five years after the banking crisis, and while the economy has returned to an expansion phase and new technologies disrupt the financial industry, Cyprus' financial literacy remains at very low levels compared to other European countries as for example Denmark, Norway and Estonia.[7]

This evidence conveys two important, yet worrisome, takeaway messages. First, it is

[7] It is interesting to note that these countries rank also relatively high in those dimensions in the Global Competitiveness Report 2019 that seem to matter the most in the new digital age. More specifically, in the information and communications technology (ICT) adoption pillar, Denmark ranks 9$^{th}$, Norway 10$^{th}$ and Estonia 16$^{th}$ while Cyprus ranks 58$^{th}$ among 141 countries. Similarly, in the skills pillar Denmark ranks 3$^{rd}$, Norway 6$^{th}$ and Estonia 15$^{th}$ while Cyprus ranks 32$^{nd}$. In the innovation capability pillar Denmark ranks 11$^{th}$, Estonia 34$^{th}$ and Norway 20$^{th}$ while Cyprus ranks 43$^{rd}$.

not evident that most people learn through adverse experiences (e.g., Lusardi, 2009). Rather, it implies that "no lesson was to be learnt from the crisis" despite the severe economic repercussions that the crisis brought on households in Cyprus. In the absence of coherent national strategy, the country seems to have missed the opportunity to exploit the crisis as a "teachable moment" to build awareness and responsibility among households, a condition that is necessary to push individuals to seeks ways to improve their financial literacy level.[8]

Second, G20 leaders have recognized financial technology (FinTech) as a promising tool to promote financial inclusion in the digital age. The evidence from Cyprus indicates, however, that financial illiteracy acts as a negative factor holding individuals back from ably adopting and using financial innovations, such as i-banking. Unfortunately, digital financial illiteracy looms as a new potential thread to the financial inclusion of individuals in the digital age of banking. Specifically, as the financial system has grown more diversified and complex, households enjoy a broader set of opportunities while potentially facing substantial new risks. But as Cyprus transitions quickly to a more digital-based banking system, with an increased adoption of electronic channels such as i-banking, financial literacy is still lagging.

Overall, given the lack of a scientific approach tracing the implications of financial literacy for consumers' i-banking behaviour, undoubtedly the results of this study could lead to significant new inferences.

## 3. Research design

### 3.1. Questionnaire design

To achieve the research objectives, a survey was conducted using an instrument developed by the authors. The developed questionnaire for evaluating financial literacy components was administered among Cypriot individuals through a telephone survey conducted by the Insights Market Research (IMR Cyprus) in October 2018. IMR Cyprus is one of the leading and most acclaimed market and survey research organizations in Cyprus with more than 17 years of presence in the industry.

A certain procedure was followed to safeguard that the final version of the survey instrument featured a logical flow of questions, construction validity of the questionnaire and

[8] Based on OECD (2009, pp. 7) "One of the few positive aspects of the current financial crisis is that it corresponds to one of these "teachable moments" when households are willing to be taught about long-term complex risks and financial issues they are generally reluctant to consider and to spend time on".

appropriate wording and tone of the questions. First, the initial draft of the survey instrument mimicked the structure and flow of the OECD (2016) international survey for measuring financial literacy.[9] This draft was then extensively discussed with one seasoned scholar who has prior experience in the field, and his feedback was vital and particularly important to verify its validity. Second, the revised survey instrument was passed to IMR Cyprus, whereby its team of experts, with a long-standing experience in market research and field surveys, made further suggestions to safeguard the logical flow of questions and a polished phrasing of the questions. Third, to assess reliability, the final version of the survey instrument was piloted with few individuals through a telephone interview. The latter ensured that it was comprehensible and that respondents could provide their answers within a reasonable time window.[10]

The questionnaire is divided into four sections. In the first section, the survey participants are asked to provide certain demographic data: gender, district of residence, area (urban or rural), age, education level, profession and monthly income level. This section also includes one further question inquiring about the daily engagement of the participants with social media (Facebook, Twitter, Instagram, et cetera).

The second section of the instrument is assessing the financial literacy competence of participants focusing on financial knowledge and skills consisting of questions that have been extensively used in surveys (see, Lusardi and Mitchell, 2011; OECD, 2016). Table 1 lists the six survey questions used to capture the financial knowledge of the respondents. These consist of (a) one recommended question as per the OECD (2016) survey and similar to one question of Lusandi and Mitchell (2011) that is related to the concept of "compound interest calculation" (Q1); (b) two questions from Lusandi and Mitchell (2011) that are related to the concepts of "understanding the consequences of inflation" (Q2) and "benefits of risk diversification" (Q3); (c) three authors' own questions that are related to the concepts of "understanding annual percentage rate (definition)" (Q4), "understanding annual percentage rate (use)" (Q5) and "awareness of crucial banking issues" (Q6).[11]

[9] The OECD/INFE International Survey of Adult Financial Literacy Competencies (2016) questions themselves are largely drawn from existing surveys and have all been validated and approved by OECD/INFE experts. They represent good practice in financial literacy and financial inclusion measurement. The questionnaire has been successfully used to capture the financial literacy of diverse populations and has been applied to more than 40 countries and economies which participated in an international survey of adult financial literacy competencies.
[10] The average length of the telephone survey was 20 minutes.
[11] Q1 and Q2 feature multiple choice answers including "Don't know / Don't answer" to dissuade respondents from guessing. Q6 is of open-ended text format, which allows respondents to answer in their own words (also allowing for "Don't know / Don't answer"). The rest (Q3, Q4 and Q5) are true and false response questions.

[Insert Table 1, here]

Questions Q1, Q2 and Q3 were introduced by Lusardi and Mitchell (2011) ― known as the Big Three ― and have been widely adopted in the US and elsewhere. Although the Big Three generally do not demand advanced financial knowledge, only 34% of respondents in the survey presented in Lusardi and Mitchell (2011) were able to answer all three questions correctly. Individuals who fail to correctly answer Q1 and Q2 will likely experience difficulties when facing even basic financial decisions characterized by an investment today and return in the future. Providing the correct answer to Q3 requires some knowledge about stocks and mutual funds as well as about the concept of risk diversification and thus indicates if respondents can effectively manage their financial assets. The aim of involving Q4 and Q5 survey questions is to test consumers' understanding of a financial term, in this case "annual percentage rate" (APR). These two questions along with Q6 are banking-specific questions in the sense that providing the correct answers to them requires some basic knowledge that people should have when engaging with banks.

The third section includes one multiple choice type question to identify the sources from which respondents seek financial advice. Recently, a lot of studies have addressed the question whether financial advice may substitute for financial capabilities or these two should be considered as complements for improving consumer's financial decision making. The literature has shown that financial advice is mostly demanded by relatively knowledgeable investors (see, for example, Hackethal et al., 2012) while less informed investors are more likely to invest without seeking advice (Collins, 2012). In the information era, internet sources and social media are new sources of information. Indeed, according to the European Commission in 2019 Cypriots are active users of the social media, with 82% social network users, putting Cyprus in the 5$^{th}$ place among EU countries. Hence, the survey further asks respondents to indicate: "*On a scale of 1 to 10 where 1 means totally disagree and 10 means totally agree, to what extent do you agree or disagree with the following statement: Social media provide very trustworthy information pertaining to economic and banking matters*".

In order to elicit financial literacy levels in the literature it has also become prevalent to involve asking survey respondents for a self-assessment of their financial capabilities (Huston, 2010; Hung et al., 2009). The literature reveals that individuals tend to be overly confident about how much they really know (see, for example, Agnew and Szykman, 2005). Hence, it is important to include both type of measurement of financial knowledge (test-based and self-assessed) and evaluate the relative magnitude of each one of these. The

corresponding item in this study related to the self-assessment of respondents on their competency in making banking decisions is worded as: "*On a scale of 1 to 10 where 1 means totally disagree and 10 means totally agree, to what extent do you agree or disagree with the following statement: I am very competent in handling matters pertaining to banking decisions*". The study also features questions on the viewpoints of consumers' behaviour such as risk aversion and optimism, self confidence in dealing with numeracy and information technology competence.

In the fourth section of the survey instrument, questions related to banking activity and banking behavior are included. The baseline analysis focuses on adults having a relationship with at least one bank. Each adult is asked to report their "main bank" and the answers are chosen from a list tabulating all banks in Cyprus. The section also includes a question on the duration of the engagement of the respondent with the main bank. All respondents are asked whether "*they have changed their main bank the last twelve months or are considering changing their main bank*".

As a measure of i-banking activity, all participants are asked the way (visiting a branch, using i-banking or going to an ATM) in which they perform a list of basic financial services (i.e., withdrawals and deposits, loan payments and utility payments). This section of the survey is also designed to understand respondents' preferences for the frequency of receiving banking services. It includes questions that asks all participants "how often" they use each banking service (visiting a branch, using i-banking or going to an ATM) in a scale of 1 to 5. In order to provide a more complete picture of the reasons explaining the usage frequency of i-banking services, the participants that reply rarely (or never) using i-banking have to indicate the following "*On a scale of 1 to 10 where 1 means totally disagree and 10 means totally agree, to what extent do you agree or disagree with the following statements: I rarely use i-banking because (a) I don't trust i-banking; (b) I don't have the necessary IT skills; (c) I don't have the necessary banking knowledge; (d) I want to have personal contact with the bank officer*".

### 3.2. Sample and respondent characteristics

The survey sample consisted of 600 adults Cyprus' residents aged between 25 and 65 years old who had the most knowledge of their household's finances and comprise the largest part of the working age population. The coverage number of 600 households is sufficiently large for the population characteristics of Cyprus and widely used in telephone surveys from

various market research companies.[12] To ensure a nationally representative sample, the survey data were collected from a stratified random sample of units that have been selected with known probabilities of selection from the population.[13] No data weighting was applied because, following their own analysis of the data collected regarding the demographical information of the respondents, the survey company advised the authors to proceed their analyses with a simple counting of the answers.

Table 2 presents statistics regarding the frequency and proportion of respondents' characteristics tabulated across female individuals, male individuals and for the entire sample. First and in terms of gender, female participants account for 50.17% of the sample while male participants account for 49.83% of the sample. About 246 of the survey participants (or 41% of the entire sample) live in Lefkosia, the capital of Cyprus, while a total of 471 (or 78.50% of the entire sample) live in an urban area. The majority of the participants hold a bachelor, a master degree or higher while the 84% comes from non-business majors at their universities. Further, 40.17% of the sample engages into a bank relationship with at least two banks while 69.33% of the adults have more than 7 years of relationship with their main bank institution. The last observation is reinforced by the percentage of 76.33% that have responded that they have not changed their main bank the last one year.

[Insert Table 2, here]

The notion that financial advice can substitute for low levels of financial literacy rests on the assumption that less knowledgeable individuals face higher hurdles with regards to the collection and processing of information and thus save more on information and search costs when turning to an advisor (Georgarakos and Inderst, 2014). Internet and social media are new sources of information. In fact, as Table 2 shows most of the respondents (41.51%) seeks financial advice through the Internet and this is well observed both between men and women. As for the daily social media activity, men and women tend to show the same behaviour with most of them reporting (55.67%) less than one hour of engagement.

[12] The predetermined target of 600 individuals is also the typical number of sample size for the Cyprus survey, which is part of the EU Program of Business and Consumer Surveys (https://ec.europa.eu/info/business-economy-euro/indicators-statistics/economic-databases/business-and-consumer-surveys_en).

[13] IMR Cyprus followed a survey design whereby interviewers make up to five attempts to survey the selected household. To increase the probability of contact and completion, attempts are made at different times. When a selected household was not possible to complete, a comparable one was used. This design resulted to a high response rate; hence, non-response bias does not constitute a problem for the quality and reliability of the results.

### 3.3. Statistical methods

For the determinants of financial literacy, we run OLS regressions using two dependent variables, namely, FK_SCORE_1 and FK_SCORE_2. Financial literacy is measured with the number of questions correctly answered to the six financial knowledge questions by the respondents. Specifically, FK_SCORE_1 is the mean score from the respondents' answers, where each correct answer takes a score of one and all other take a score of zero, and FK_SCORE_2 is the mean score where each correct answer takes a score of one, each wrong answer takes a score of minus one and responses of "Don't know/Don't answer" take a score of zero. All variable definitions are provided in Table 3.

[Insert Table 3, here]

The following multivariate regression model for the determinants of financial knowledge ($FK_i$) is estimated:

$$FK_i = a + b_k X_{ik} + e_i, \quad (1)$$

where $X_{ik}$ is the vector of $k$ explanatory variables that are considered as important antecedents for financial knowledge. The empirical specification in Eq. (1) recognizes that there is a large array of possible financial knowledge determinants. Accordingly, it initially includes the self-assessment of financial knowledge score (FK_SCORE_SELF) on the basis that a low self-assessment is expected to be associated with a lower participation in financial markets since individuals who believe they have low financial competencies are less inclined to hold investment products. As in the previous studies, demographics such as gender (GENDER), age (MILLENIALS), education level (UNIVERSITY), field of study (BUSINESS_MAJOR) and income (HIGH_INCOME) are added. For personal traits and skills that may influence the financial literacy level the variables included are math skills (MATHS_SKILLS) and cognition in avoiding information involving numbers (AVOID_NUMBERS).

To gain more insights about the determinants of financial knowledge a larger set of control variables is considered in additional analyses. For the socio-demographics, variables about residence and field of employment are added: a dummy that equals one if the respondent lives in the capital (METROPOLITAN), a dummy that equals one if the respondent lives in an urban area (URBAN) and a dummy that equals one if the respondent is employed in the financial services industry (FINANCIAL).

The specifications also control for further covariates regarding banking activity which, according to the current state of research, may have an influence on knowledge and understanding of personal finance. The covariates included a dummy that equals one if the respondent has a relationship with three or more financial institutions (MULTIPLE_BANKS), a dummy that equals one if the respondent has a relationship with the main financial institution for seven years or more (LONG_MAIN_BANK) and a dummy that equals one if the respondent has changed the main financial institution in the last twelve months (CHANGED_BANK).

One dummy is also included for skills in using information technology (IT_SKILLS) because these skills feature individuals' aptitude to effectively make sound decisions when using financial services via information technologies. Finally, as discussed above, the literature is not clear about whether people who lack financial knowledge are more likely to seek advice to make up for their shortfalls. Despite the mixed evidence, financial literacy level can be associated with some measures of financial behaviour for example the source of financial information. To take this into account additional information was used that can serve as instruments for the learning mechanism (ADVICE_PROFESS) and social networks (HIGH_SOCIAL_MEDIA).

The study also investigates the factors that influence individuals' preferences for accessing banking services and whether financial literacy plays a role in their decision to frequently use i-banking. In this vein, the analysis employs OLS regressions using two different dependent variables: (i) VISIT, which corresponds to a variable taking a value between one (rarely or never) and five (almost every day) relating to the frequency of visiting a branch within a month; (ii) ONLINE, which corresponds to a variable taking a value between one (rarely or never) and five (almost every day) relating to the frequency of using i-banking within a month. Accordingly, for each specification the following multivariate regression model is estimated:

$$Y_i = \alpha + \beta(FK_i) + \gamma_k Z_{ik} + \varepsilon_i, \quad (2)$$

where the dependent variable $Y_i$ is either the frequency of visiting a branch (VISIT) or the frequency of using i-banking (ONLINE). Also, the following logistic regression model is employed to estimate respondents' behaviour:

$$Y_i = \alpha + \beta(FK_i) + \gamma_k Z_{ik} + \varepsilon_i, \quad (3)$$

where the dependent variable $Y_i$ (i) takes the value of one when the respondent has

answered "rarely (or never)" visiting a branch within a month and zero otherwise (VISIT_RARE); (ii) takes the value of one when the respondent has answered "rarely (or never)" using i-banking within a month and zero otherwise (ONLINE_RARE).

In Eqs. (2) and (3), the variable $FK_i$ denotes the financial knowledge measure FK_SCORE_1, which is expected to be positively related to i-banking usage and negatively related to the visits to the branch.[14] The vector of explanatory variables $Z_{ik}$ includes socio-demographics, i.e. gender (GENDER), age (MILLENIALS) and residence (METROPOLITAN and URBAN), the same banking activity variables as before (MULTIPLE_BANKS, LONG_MAIN_BANK and CHANGED_BANK) and two variables capturing behavioural characteristics, i.e. tendency to take risks (RISK_TAKING) and optimism (OPTIMISM). In order to investigate the respondents' i-banking behaviour, an additional set of variables is considered that are expected to be associated with i-banking: skills in using information technology (IT_SKILLS), cognition in avoiding information involving numbers (AVOID_NUMBERS) and two behavioural characteristics related to social media, i.e. daily use of social media (HIGH_SOCIAL_MEDIA) and trust in social media (TRUST_SOCIAL_MEDIA).

# 4. Findings

## 4.1. Descriptive analysis

The breakdown of the responses to financial knowledge questions by female individuals, male individuals and for the entire sample is reported in Table 4. Panel A shows that more than half of the respondents answered correctly to the question on inflation (Q2) and to the question on awareness of crucial banking services (Q6). The percentage of correct answers to the question on understanding annual percentage rate (definition) (Q4) and benefits of risk diversification (Q3) is, respectively, 49.67% and 50.67%. The compound interest rate question (Q1) and the understanding of annual percentage rate (usage) (Q5) presented more of a challenge, since only 42% and 42.5% of respondents could answer accurately, respectively. Over the entire sample, only 5.33% of the respondents correctly answered to all questions. According to the OECD (2016) methodology, a good financial knowledge proficiency level — i.e., featuring a financially literate individual — is defined

[14] Similar regression results are obtained when using the alternative financial knowledge score, namely FK_SCORE_2.

when about 70% of the questions are answered correctly. Thus, in this study a good financial knowledge proficiency level refers to those answering at least 4 out of 6 financial literacy questions correctly. In this spirit, for the Cypriot case, 37.33% of the respondents appear to have a good financial knowledge proficiency level and can be perceived as being financially literate individuals.

[Insert Table 4, here]

A robust finding across many countries is a gender gap with respect to financial literacy (Lusardi and Mitchell, 2008; Lusardi and Tufano, 2009, 2015; Hung et al., 2009; Mottola, 2013; Bucher-Koenen et al., 2016; Agnew and Harrison, 2015; Klapper et al., 2015): men usually score higher on measured financial literacy than women. The distribution of correct answers to the six financial knowledge questions indeed varies markedly with gender. Among those with all correct answers, only 1.67% are women while the respective percentage for men is more than double (3.67%). At the same time, the percentage of women with no correct answers is 4% while of men only 1.67%. Women are also much more likely to state that they cannot answer a question, indicative of very low levels of financial knowledge; this is most pronounced for the awareness of crucial banking issues question, to which 20.33% of women cannot give an answer. Although for the annual percentage rate questions (Q4 and Q5) the correct responses are consistent across gender, the division among correct responses becomes particularly noticeable when looking at Q1, Q2 and Q6. The first (Q1) is the question which presents the lowest frequency of correct answers, while the two other questions (Q2 and Q6) are those with the highest frequencies in the entire sample. Moreover, it is interesting that although in the first two questions, related to fundamental financial knowledge, women score well below men, in the next three questions, which are more bank related, women score relatively well compared to men. These results could be used as evidence for the preferences and attitudes of women banking customers. Specifically, when combined with the summary statistics presented in Table 2, women tend to have a relationship with fewer banks than men and for a longer duration while they turn to a bank clerk as one of their primary sources of financial advice more often than men.

Table 5 reports summary statistics for the financial literacy variables (FK_SCORE_1 and FK_SCORE_2) and all control variables used in the regression analysis over the entire sample, for the subsample of respondents who answered fewer than four questions correctly (perceived as being financiallly illiterate) and for the subsample of respondents who answered at least four questions correctly (perceived as being financial literate). The last

column of this table reports the Pearson's correlations of the variables with the main financial literacy score (FK_SCORE_1).

[Insert Tables 5, here]

As reported in Table 5, the mean values for FK_SCORE_1 and FK_SCORE_2 are 0.498 and 0.119, respectively, whilst these two financial knowledge scores are highly correlated as expected (correlation coefficient of 0.962, *p*-value<0.01). The mean score from the self-assessment of the respondents' financial knowledge (FK_SCORE_SELF) is 6.387. Although respondents present poor financial knowledge level, the results indicate that people believe they do fairly-well on average. The Pearson correlation between FK_SCORE_1 and FK_SCORE_SELF is 0.206 (*p*-value<0.01). This low correlation supports to some extent the disparity between the measured and perceived financial knowledge. The research on financial literacy suggests that perceived financial knowledge might not simply be a proxy for actual financial knowledge but a different measure of knowledge. Agnew and Szykman (2005) find that the correlations between perceived and actual financial knowledge of investments vary considerably depending on the characteristics of the individual. Parker et al. (2012) report only a modest correlation between actual and perceived financial knowledge while van Rooij et al. (2011) find that on average there is a positive association between subjective and objective measures of financial knowledge. Andreou and Philips (2018) provide evidence that there is a moderate positive correlation between self-reported and measured financial knowledge scores and thus Cypriot students are somehow aware of their (poor) financial knowledge capacity.

Other patterns reported in Table 5 are also of interest. Women are less financially literate than men (GENDER) and respondents aged 39 years old or younger (MILLENNIALS) are fewer in the sample of knowledgeable respondents. These mean differences stand at 0.102 (*p*-value<0.01) and -0.116 (*p*-value<0.01), respectively, and confirm other recent evidence of low financial literacy among women and young adults (see, for example, Lusardi et al., 2010; Andreou and Philip, 2018). This evidence is also corroborated by the correlations for these two variables with FK_SCORE_1, which are 0.169 (*p*-value<0.01) and -0.146 (*p*-value<0.01) respectively. The number of respondents attending a university (UNIVERSITY), the number of respondents majoring in Business at the university level (BUSINESS_MAJOR) and the number of respondents employed in the financial services industry (FINANCIAL) are statistically higher (*p*-values<0.01) in the financially literate sample, suggesting that education and employment play a very important

role for financial literacy. Furthermore, all of the corresponding correlations of these variables with FK_SCORE_1 are positive and highly statistically significant. Table 5 also provides supporting evidence that higher income individuals (HIGH_INCOME) appear to be more financially literate compared to lower income groups (mean difference = 0.092, *p*-value<0.01; correlation coefficient = 0.195, *p*-value<0.01).

Individuals with multiple bank activity (relationship with three or more financial institutions) are more likely to be financially literate. Specifically, the mean score of multiple bank activity (MULTIPLE_BANKS) is statistically higher (mean difference = 0.107, *p*-value<0.01) in the sample of financial literate individuals, i.e. highly knowledgeable individuals tend to engage with three or more financial institutions (correlation coefficient = 0.123, *p*-value<0.01). Conversely, the proportion of individuals having a relationship with their main bank for seven years or more (LONG_MAIN_BANK) is higher in the financially literate sample (mean difference = 0.083, *p*-value<0.05), whereby its correlation with FK_SCORE_1 is 0.134 (*p*-value<0.01). However, changing the main financial institution (CHANGED_BANK) in the last 12 months does not appear to be statistically significant between the two samples.

Regarding the characteristics and skills that matter for financial literacy scores the results show that the mean score of mathematical skills (MATHS_SKILLS) and information technology skills (IT_SKILLS) are statistically higher (*p*-values<0.01) in the financially literate sample. Both variables are also positively correlated with FK_SCORE_1 (*p*-values<0.01). Regarding the two financial behaviour variables, i.e. risk taking (RISK_TAKING) and optimism (OPTIMISM), they also appear to be higher in the financially literate sample, while the mean score for cognition in avoiding numbers is higher in the financially illiterate sample. However, none of these three mean differences appear to be statistically significant between the high and low financial knowledge groups.

An important question the paper aims to answer is not only whether respondents possess financial knowledge but also whether financial literacy matters in financial decision-making and banking relationships. This is done by first examining whether the sources of information individuals consult when making financial decisions is related to literacy levels and then by examining whether financial knowledge affects the usage of banking services. Table 5 shows that a higher proportion of respondents who rely on professional sources of information (ADVISE_PROFESS) are in the high knowledgeable group, although the mean differences are not statistically significant. Yet, the correlation of this variable with

FK_SCORE_1 is 0.082 and statistically significant ($p$-value<0.05). Recent studies provide evidence pointing both to a negative relationship between financial literacy and the demand for expert financial advice (see, for example, Hung and Yoong, 2010 for US) and to a positive relationship (see, for example, Bhattacharya et al., 2012 for Germany), while Georgarakos and Inderst (2014) report no relationship. The results of this study, pointing to a weak univariate relationship between financial literacy and the propensity to seek advice from professionals, may be partly explained by the fact that mean score form the self-assessment of the respondents' financial knowledge in Cyprus is quite high (as discussed previously) which prevents individuals from seeking professional advice. However, the mean score for trust to social media (TRUST_SOCIAL_MEDIA) is significantly lower in the financial literacy group (mean difference = -0.468, $p$-value<0.10; correlation coefficient = -0.106, $p$-value<0.01). This is a good indication that financially literate individuals better understand that they cannot trust social media information that may be associated with fake news and scams. Of course, at the same time financially illiterate individuals may therefore be more prone to falling prey to social media pressure and envy (see, also Andreou and Philip, 2018).

### 4.2 Determinants of financial literacy

Table 6 reports the OLS regression estimates using the two dependent variables, namely FK_SCORE_1 in models (1)-(2) and FK_SCORE_2 in models (3)-(4). A variance inflation factor (VIF) test is run to check multicollinearity in the independent variables showing no problems (VIF<1.500).

The results of the regression analysis in models (1) and (2) indicate that self-reported financial knowledge is statistically significant ($p$-values<0.05) and positively associated with the individuals' level of financial knowledge, suggesting that there is a positive relationship between measured and perceived financial knowledge. However, this is marginally significant under the FK_SCORE_2 measure in models (3) and (4) ($p$-values<0.10) which takes into account the assumption that low levels in financial literacy may be the result of individuals feeling less confident in their financial knowledge and thus more inclined to answer "do not know".

Models (1) and (3) further indicate that gender (GENDER) is positive and high statistically significant ($p$-values<0.01); female respondents score on average worse than

male respondents. This finding is supported by rich empirical data gathered through numerous previous studies (see, for example, Lusardi and Mitchell, 2008; Lusardi and Mitchell 2011). The significant financial literacy-gender bias is apparent for both measures of financial knowledge and remains strong even after controlling for the larger set of variables in models (2) and (4), an evidence that also squares with the findings for Cyprus in Andreou and Philip (2018).

Another robust finding across countries reported by prior studies is that financial literacy levels are lowest among the young and the old (see, for example, Lusardi et al., 2010; Lusardi and Tufano, 2015; inter alia). Thus, a hump-shaped distribution of financial literacy is generally observed with respect to age. Individuals aged 39 years old, the so-called millennials or generation Y, or younger show lower levels of financial literacy. Low literacy among the young might be problematic since this group faces financial decisions that influence their (financial) well-being for decades to come. Moreover, this generation, now making up the largest share of the labour market, is vital to financial institutions' success. Individuals aged 39 years old or younger, are increasingly swapping out traditional banks for new banking options and retail banking needs to adjust its business models, products and services to keep pace with the evolving views of this younger but maturing generation. In fact, results in models (1) and (3) indicate that respondents aged 39 or younger (MILLENIALS) scored on average lower than the older respondents ($p$-values<0.10), and this finding remains unchanged even after considering a larger set of explanatory variables($p$-values<0.10).

Moreover, results in models (2) and (4) show that those that are employed in the financial services industry (FINANCIAL) tend to be more financially literate ($p$-values<0.10). This can be explained by the fact that those working in the finance industry could better understand and be more aware of the economic and financial concepts, and hence have a higher level of financial literacy.

Education (UNIVERSITY) plays a statistically significant role ($p$-value<0.01) in explaining financial knowledgeable individuals. The finding is consistent with the existing literature where education is one of the most important factors in ensuring adequate levels of understanding of financial concepts (cite studies). There is also evidence to support that individuals who studied in business departments (BUSINESS_MAJOR) are more likely to be knowledgeable about finance than those in nonbusiness departments. This means that those with a high level of education and with business major obviously have a higher level of

financial literacy. The result suggests that students' courses related to finance have a significant impact on financial literacy in university education (see, for example, Chen and Volpe (1998), Xiao et al. (2007)). Models (1) and (2), reporting statistically significant (*p*-value<0.05 and *p*-values<0.10 respectively) positive coefficients of the high income variable (HIGH_INCOME), lend credence to the notion that individuals with high income are more financially knowledgeable than those with low income lower.

An interesting result is that both having a relationship with three or more financial institutions (MULTIPLE_BANKS) and having a long relationship (seven years or more) with the main institution (LONG_MAIN_BANK) play only a marginally significant role under the FK_SCORE_1 measure (*p*-value<0.10) and no significant role under the FK_SCORE_2 measure.

In terms of evaluating the statistical significance of respondents' soft skills and traits, the results show that individuals who consider themselves good in mathematics (MATHS_SKILLS) have statistically higher financial knowledge (*p*-value<0.01). Results do not support the hypothesis that there is a statistically significant relationship between seeking financial advice from professionals (ADVICE_PROFESS) and financial knowledge, something that squares with the univariate evidence of Table 5. The same holds true for the HIGH_SOCIAL_MEDIA variable.

[Insert Table 6, here]

**4.3 Usage of banking services**

Models (1) and (3) of Table 7 (Panel B) report OLS regression estimates using the two different dependent variables: (i) model (1) employs VISIT, which corresponds to a variable taking a value between one (rarely or never) and five (almost every day) relating to the frequency of visiting a branch within a month; (ii) model (3) employs ONLINE, which corresponds to a variable taking a value between one (rarely or never) and five (almost every day) relating to the frequency of using i-banking within a month. Table 7 models (2) and (4) report the logistic regressions results to estimate respondents' behaviour. The definition of these dependent variables and the associated distributions are showed analytically in Panel A of Table 7.

[Insert Table 7, here]

The pattern of responses to the question "*How often are you using the following banking services within a month: visit to the branch and i-banking usage?"* as presented in

Panel A of Table 7, show that 33.83% of the respondents replied that they rarely (or never) use i-banking. This is in line with the overall picture of i-banking use in Cyprus presented in Section 2. However, given that most of the sample consists of people having a bank account the next research question could be to explore the determinants of this behaviour.

As shown in Panel B of Table 7 models (1) and (2) indicate that financial knowledge is negatively associated with the preference of customers to visit a branch for receiving on the spot banking services. Other interesting results from model (2) include the observation that the odds of visiting a branch rarely (or never) are 1.887 higher for young individuals (MILLENIALS) ($p$-value<0.01) while, by contrast, they are 0.529 lower for those that have a relationship with three or more banks (MULTIPLE_BANK) ($p$-value<0.01) and 0.662 lower for those who have changed their main financial institution the last twelve months (CHANGED_BANK) ($p$-value<0.10).[15]

Models (3) and (4) provide further evidence to support that financial literacy plays a pivotal role in the choice of channel for receiving banking services. As per these models, the usage of i-banking is largely driven by the financial literacy (FK_SCORE_1) of individuals with strong statistical significance (p-value<0.01). Financially knowledgeable individuals tend to use i-banking significantly more often and this result remains strong after including a large set of socio-demographics, as well control variables for skills, traits and behavioural characteristics. Specifically, results in model (3) indicate that a one standard deviation increase in FK_SCORE_1 increases by 0.092 standard deviations i-banking usage ($p$-value<0.05). Further, in model (4), the logistic regression coefficient for FK_SCORE_1 is equal to -0.497 ($p$-value<0.01) meaning that the odds of using i-banking "rarely (or never)" are 60.8% lower for one standard deviation increase in the respondents' mean financial knowledge score. Accordingly, this result implies that the odds of *frequently* using i-banking are increased by more than 64% for one standard deviation increase in the respondents' mean financial knowledge score.[16]

Other factors that contribute to respondents' use of i-banking are age, area of residence and soft skills. Millennials (MILLENIALS) ($p$-value<0.01) and those that live in an urban

[15] Models (2) and (4) report logistic regression coefficients, hence, to calculate the odds we need to apply exponentiation in the log of the odds. For example, the odds for the MILLENIALS in model (2) is given by $exp(0.635)$.

[16] Conversely, we could define the dependent variable as ONLINE_FREQUENT by reversing the logical value in the variable ONLINE_RARE; i.e. ONLINE_FREQUENT is defined to take the value of zero when the respondent has answered "rarely (or never)" using i-banking within a month and one otherwise. In this case, the logistic regression coefficient for FK_SCORE_1 would be equal to 0.497 implying an odds ratio estimate of 1.644 ($exp(0.497)$).

area (URBAN) ($p$-value<0.10) are significantly more frequent users of i-banking and the same holds for those with greater skills in using information technology (IT_SKILLS) ($p$-value<0.01) and with risk-taking behaviour (RISK_TAKING) ($p$-value<0.05). More specifically, in model (4) the odds of rarely (or never) using i-banking are 0.284 lower for MILLENIALS and 0.614 lower for those living in an URBAN area. A one standard deviation increase in the mean score for skills in using information technology, reduces by 40.8% the odds of rarely (or never) using i-banking. A one standard deviation increase in the mean score for risk taking behaviour (RISK_TAKING), reduces by 79% the odds of rarely (or never) using i-banking, while this variable turns out insignificant for visiting a branch (VISIT_RARE) in model (2). As such, it lends credence to the notion that that trust is an essential element for the adoption of i-banking. Respondents with a greater tendency to expect more good things to happen (OPTIMISM) have a lower probability of using i-banking in model (3) although this is not a statistically significant factor explaining respondents' absence from engaging in i-banking in model (4). However, the high daily use of social media (HIGH_SOCIAL_MEDIA) is not found to be a statistically significant influencing factor for i-banking.

To gain more insight about the reasons for using i-banking rarely (or never), the survey participants are asked to provide on a scale of one to ten, where one means totally disagree and ten means totally agree, to what extent they agree or disagree with four statements. Table 8, Panel A presents the summary statistics of the responses for those questions. The analysis of barriers to i-banking usage shows that personal contact with a bank officer is the most prominent reason for 61.08% of the respondents that use i-banking rarely (or never). At the same time, 42.36% totally agree that lack of information technology skills and 40.39% totally agree that lack of banking knowledge is the reason for using i-banking rarely (or never).

In fact, Panel B of Table 8 reports the distribution of observations, as well as the mean and the standard deviation of the statement's score, for the entire sample, for the subsample of financially illiterate and for the subsample of financially literate respondents. In general, results show that financially literate individuals are less inclined to report the lack of skills (either lack of information technology skills or lack of necessary banking knowledge) as a reason for not using i-banking. The mean difference between the means of the two groups (literate versus illiterate) is statistically significant both for information technology skills and necessary banking knowledge ($p$-value<0.01). Moreover, as already evidenced by the regression estimates of Table 7, trust in i-banking services is again a significant dimension

for i-banking usage between the two groups. Financially literate respondents perceive the lack of trust in i-banking as a less significant factor for using i-banking rarely (or never) than financially illiterate respondents.

Overall, Table 8 highlights one basic consumer perception that restrains financially illiterate individuals from adopting and using i-banking: bank transactions can be realized better through personal contact with a bank officer. The results also indicate that most Cypriot bank customers are self-assessed as "low knowledgeable" regarding their "information technology skills" and their "basic banking knowledge". These two characteristics prevent many consumers in Cyprus from using i-banking services and make them more inclined to visit a branch to receive banking services.

[Insert Table 8, here]

## 5. Conclusions and policy implications

The digital age and the advent of financial technologies have enabled access to a variety of financial products and services with only a click. But little research has considered how the use of these new technologies is related to financial literacy. This paper examines the survey results for financial literacy among Cypriot adults and reports their financial aptitude and behaviour. Additionally, it investigates for the first time the implications of financial literacy on the respondents' usage of i-banking services.

The results show that only 37.33% of the respondents have a good financial knowledge proficiency level, with the problem appearing significantly more severe with women and the young population. Some interesting results of this study that are in line with previous empirical evidence for Cyprus (e.g. Andreou and Philip, 2018) include the gender gap with males reporting higher levels of financial literacy than females and an income and education channel affecting financial literacy. Overall, the combined evidence shows that Cyprus ranks rather low in the global arena of financial literacy.

Moreover, the results of the study reveal a strong positive relationship between i-banking usage and financial literacy. While a percentage of 33.83% of the respondents replied that they rarely (or never) use i-banking, a higher financial knowledge score is positively associated with more frequent i-banking use and negatively associated with visiting a branch for receiving on the spot banking services. Millennials tend to use i-banking

more often and the same holds true for those living in an urban area. Some skills are more important in explaining the frequent usage of i-banking, namely skills in using information technology, and risk-taking behaviour appears to be a significant factor of i-banking usage. Consumers' banking relationships and activity interplays partly with respondents' preferences for receiving banking services. The respondents that engage in banking with more than three financial institutions are more likely to visit a branch instead of using the i-banking.

The findings from this study have important implications for research and policy related to household finance. Particularly, they point to the unrivalled need to develop or re-shape national strategies for financial education to improve digital financial literacy and capability. Such strategies can equip and empower individuals with the required financial knowledge and skills, to cultivate confidence in seeking appropriate financial advice, avoid irrational behaviour and foster acumen to prudently evaluate economic conditions. Digital financial literacy programmes can not only educate and train consumers to effectively utilize digitalized financial products and services, but also can empower them to better manage digital financial risks, avoid digital malicious activity (e.g., phishing, hacking attacks, unauthorized use of data), etc. In Cyprus and worldwide, it is imperative to prepare individuals adequately for their participation in the new digital age, wherein FinTech are disrupting banking services and new technologies are radially transforming the global economy and society.

The above recommendations resonate with policy guidance suggesting that greater digital financial literacy and confidence of consumers may nurture more balanced behaviours in regards of the management of their wealth and budget in the long term (see, for example, OECD, 2015, 2016, 2018). Undoubtedly, such policy measures could enable individuals to be ready to actively engage and benefit in the era of digital finance. This endeavour is even more imperative as the OECD (2009, pp. 9) notes that "in today's complex world, the development of an appropriate regulatory framework is essential, but not necessarily enough to guarantee the soundness of the financial system and the financial protection and well-being of individuals…. [hence] financial education should be developed hand-in-hand with an efficient regulatory framework". Therefore, increased digital financial literacy could enable individuals to make well-informed and sound decisions, to prevent irresponsible behaviour and to better judge the risks and benefits associated with products and services offered through financial technologies. Accordingly, policy intervention towards empowering

individuals' digital financial literacy could play an important role in ensuring financial and economic stability and in mitigating the risks and impacts of future financial crises by making households more resilient to shocks.

In the specific Cypriot context, the overall findings stress the need for immediate reforms at the secondary and tertiary level of education in the country. In this direction, including a "Personal Finance" course as a compulsory subject in the curricula of schools and universities could enable students to learn important financial concepts that will help then make sound financial decisions through their lives. This education should be followed up in training and life-long programmes for everyone. The financial industry should also be actively involved in programmes focusing on all aspects of financial education for example by offering free online training courses for teachers, by designing interactive activities and organising competitions for students to test their financial knowledge, by sending newsletters to schools, etc.

Further, in order to regularly monitor financial behaviour and evaluate the effectiveness of financial education initiatives, the development of a wave of survey every three years in collaboration with a team of experts is needed. Moreover, with a view to improving consumer protection in the financial market the government should also evaluate the impact and suitability of the various programmes launched over the years across countries so that best practices can be replicated in Cyprus. For example, in order to bring responsible financial advice and guidance to a larger part of the population a cell centre helpline could offer free counselling to assist consumers to ensure sound decision making and prevent over-indebtedness. A website could also be set up, aiming at gathering currently dispersed information and distributing it using simple and educational language and at creating a community area for exchanging experiences. Also, developing interactive applications has been proven to be very useful in promoting financial education.

Last but not least, to provide individuals with basic financial knowledge an independent body responsible for financial education could be created in cooperation with the Central Bank and other institutions, like the Security and Exchange Commission, the Stock Exchange, financial and academic institutions. This independent organization could act as a platform aiming to coordinate financial education initiatives in Cyprus by providing educational activities at all levels and by increasing the dissemination of knowledge (for example by organizing seminars, workshops, round tables discussions and competitions) to increase digital financial literacy.

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## Table 1: Financial knowledge questions.

This table lists the survey questions to capture the financial knowledge of respondents. The second column lists the question topic, the third column reports the question source, the fourth column provides the detailed wording of the question and the fifth column lists the available answer options per question.

| No. | Question topic | Question source | Question wording | Answer options |
|---|---|---|---|---|
| Q1 | Compound interest calculation | QK6 from OECD/INFE (2016) | Suppose you put €100 into a (no fee, tax-free) savings account with a guaranteed interest rate of 2% per year. You don't make any further payments into this account and you don't withdraw any money. How much would be in the account at the end of five years? | Exactly €110<br>Less than €110<br>More than €110<br>Exactly €102<br>Don't Know<br>Don't Answer |
| Q2 | Understanding & consequences of inflation | Q2 from Lusardi and Mitchell (2011) | Imagine that the interest rate on your savings account was 1% per year and inflation was 2% per year. After one year, how much would you be able to buy with the money in the account? | More than today<br>Exactly the same<br>Less than today<br>Don't Know<br>Don't Answer |
| Q3 | Benefits of risk diversification | Q3 from Lusardi and Mitchell (2011) | Buying a stock of a single company is usually safer than buying a stock of a mutual fund. | True<br>False |
| Q4 | Understanding of APR (definition) | Authors' own question | The Annual Percentage Rate (APR) includes all relevant costs to determine the total cost of credit for a loan. | True<br>False |
| Q5 | Understanding of APR (usage) | Authors' own question | The Annual Percentage Rate (APR) is the appropriate tool to consider when assessing loans offered by different banks. | True<br>False |
| Q6 | Awareness of crucial banking issues | Authors' own question | In Cyprus, deposit guarantee schemes protect depositors' savings by guaranteeing deposits of up to €_____. | Open response<br>Don't Know<br>Don't Answer |

**Note:** The sources include: OECD/INFE (2016) International Survey of Adult Financial Literacy Competencies *OECD Publishing, Paris*, and Lusardi, A. and Mitchell, O.S., 2011. Financial literacy around the world: an overview. Journal of Pension Economics & Finance, 10(4), pp.497-508.

## Table 2: Respondent characteristics.

This table reports summary statistics regarding the frequency and proportion of respondent characteristics tabulated across female individuals, male individuals and for the entire sample.

| | Female | | Male | | Entire sample | |
|---|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | Frequency | % |
| *A. Demographics* | | | | | | |
| 1. Gender | 301 | 50.17 | 299 | 49.83 | 600 | 100 |
| 2. District | | | | | | |
| a) Lefkosia | 125 | 20.83 | 121 | 20.17 | 246 | 41.00 |
| b) Lemesos | 85 | 14.17 | 84 | 14.00 | 169 | 28.17 |
| c) Larnaka | 51 | 8.50 | 53 | 8.83 | 104 | 17.33 |
| d) Ammochostos | 16 | 2.67 | 16 | 2.67 | 32 | 5.33 |
| e) Paphos | 24 | 4.00 | 25 | 4.17 | 49 | 8.17 |
| 3. Area | | | | | | |
| a) Urban | 236 | 39.33 | 235 | 39.17 | 471 | 78.50 |
| b) Rural | 65 | 10.83 | 64 | 10.67 | 129 | 21.50 |
| 4. Years of age | | | | | | |
| a) 25 to 29 | 40 | 6.67 | 40 | 6.67 | 80 | 13.33 |
| b) 30 to 39 | 75 | 12.50 | 76 | 12.67 | 151 | 25.17 |
| c) 40 to 49 | 76 | 12.67 | 74 | 12.33 | 150 | 25.00 |
| d) 50 to 59 | 74 | 12.33 | 74 | 12.33 | 148 | 24.67 |
| e) 60 to 65 | 36 | 6.00 | 35 | 5.83 | 71 | 11.83 |
| 5. Family Income | | | | | | |
| a) Lower than 20,000 euro | 124 | 20.67 | 109 | 18.17 | 233 | 38.83 |
| b) 20,001 to 40,000 euro | 85 | 14.17 | 96 | 16.00 | 181 | 30.17 |
| c) 40,001 to 60,000 euro | 39 | 6.50 | 36 | 6.00 | 75 | 12.50 |
| d) More than 60,001 euro | 15 | 2.50 | 28 | 4.67 | 43 | 7.17 |
| 5) Don't Know / Don't Answer | 38 | 6.33 | 30 | 5.00 | 68 | 11.33 |
| *B. Education & Profession* | | | | | | |
| 1. Level | | | | | | |
| a) Master or higher | 76 | 12.67 | 81 | 13.50 | 157 | 26.17 |
| b) Bachelor | 94 | 15.67 | 87 | 14.50 | 181 | 30.17 |
| c) High School (tertiary) | 83 | 13.83 | 93 | 15.50 | 176 | 29.33 |
| d) Technical (tertiary) | 34 | 5.67 | 27 | 4.50 | 61 | 10.17 |
| e) Lower than tertiary | 14 | 2.33 | 11 | 1.83 | 25 | 4.17 |
| 2. University disciplines | | | | | | |
| a) Business majors | 38 | 6.33 | 58 | 9.67 | 96 | 16 |
| b) Non-business majors | 263 | 43.83 | 241 | 40.17 | 504 | 84 |
| 3. Profession | | | | | | |
| a) Blue collar | 17 | 2.83 | 71 | 11.83 | 88 | 14.67 |
| b) General Services | 122 | 20.33 | 125 | 20.83 | 247 | 41.17 |
| c) Financial Services | 23 | 3.83 | 35 | 5.83 | 58 | 9.67 |
| d) Education | 44 | 7.33 | 20 | 3.33 | 64 | 10.67 |
| e) Other | 95 | 15.83 | 48 | 8 | 143 | 23.83 |
| *C. Bank Activity* | | | | | | |
| 1. Number of bank relationships | | | | | | |
| a) One bank | 113 | 18.83 | 108 | 18 | 221 | 36.83 |
| b) Two banks | 131 | 21.83 | 110 | 18.33 | 241 | 40.17 |
| c) Three banks | 45 | 7.5 | 50 | 8.33 | 95 | 15.83 |
| d) More than three banks | 8 | 1.33 | 23 | 3.83 | 31 | 5.17 |
| e) Don't Know / Don't Answer | 4 | 0.67 | 8 | 1.33 | 12 | 2 |
| 2. Main bank relationships duration | | | | | | |
| a) Less than 1 year | 27 | 4.5 | 23 | 3.83 | 50 | 8.33 |
| b) 1 to 3 years | 13 | 2.17 | 22 | 3.67 | 35 | 5.83 |
| c) 4 to 7 years | 46 | 7.67 | 44 | 7.33 | 90 | 15 |
| d) More than 7 years | 213 | 35.5 | 203 | 33.83 | 416 | 69.33 |
| e) Don't Know / Don't Answer | 2 | 0.33 | 7 | 1.17 | 9 | 1.5 |
| 3. Main bank preference (recent 12 months) | | | | | | |
| a) Yes, I have changed | 47 | 7.83 | 47 | 7.83 | 94 | 15.67 |

| | | | | | | |
|---|---|---|---|---|---|---|
| b) I am thinking to change | 22 | 3.67 | 22 | 3.67 | 44 | 7.33 |
| c) No, I haven't changed | 230 | 38.33 | 228 | 38 | 458 | 76.33 |
| d) Don't Know / Don't Answer | 2 | 0.33 | 2 | 0.33 | 4 | 0.67 |
| *D. Other* | | | | | | |
| 1. Source of financial advice | | | | | | |
| a) Parents or Friends | 51 | 8.5 | 61 | 10.17 | 112 | 18.67 |
| b) Bank clerk | 64 | 10.67 | 51 | 8.50 | 115 | 19.17 |
| c) Professionals | 24 | 4.00 | 24 | 4.00 | 48 | 8.00 |
| d) Internet/Media | 115 | 19.17 | 134 | 22.33 | 249 | 41.51 |
| e) Other | 47 | 7.83 | 29 | 4.83 | 76 | 12.67 |
| 2. Social media activity (per day) | | | | | | |
| a) No account | 62 | 10.33 | 64 | 10.67 | 126 | 21.00 |
| b) Less than 1 hour | 102 | 17.00 | 106 | 17.67 | 208 | 34.67 |
| c) 1 to 3 hours | 92 | 15.33 | 87 | 14.5 | 179 | 29.83 |
| d) More than 3 hours | 45 | 7.50 | 42 | 7.00 | 87 | 14.50 |

## Table 3: Variable definitions.

| Variable name | Variable description |
|---|---|
| *Financial Knowledge* | |
| FK_SCORE_1 | The mean score from the financial knowledge responses (see, Table 4), whereby each correct answer takes a score of 1, whilst all other answers take a score of 0. |
| FK_SCORE_2 | The mean score from the financial knowledge responses (see, Table 4), whereby each correct answer takes a score of 1, each wrong answer takes a score -1 and responses of "Don't Know" or "Don't Answer" take a score of 0. |
| FK_SCORE_SELF[1] | Respondents self-assessment of their competency in making decisions pertaining to their banking affairs. |
| *Demographics* | |
| GENDER | 1 if male, 0 if female. |
| MILLENNIALS | 1 if the respondent is 39 years old or younger, 0 otherwise. |
| METROPOLITAN | 1 if the respondent lives in the capital (Lefkosia), 0 otherwise. |
| URBAN | 1 if the respondent lives in an urban area, 0 otherwise. |
| FINANCIAL | 1 if the respondent is employed in the financial services industry, 0 otherwise. |
| UNIVERSITY | 1 if the respondent has attended a university, 0 otherwise. |
| BUSINESS_MAJOR | 1 if respondent's major at university is in business, 0 otherwise. |
| HIGH_INCOME | 1 if respondent's annual income is €60,000 or more, 0 otherwise. |
| *Banking Activity* | |
| MULTIPLE_BANKS | 1 if the respondent banks with three or more financial institutions, 0 otherwise. |
| LONG_MAIN_BANK | 1 if the respondent banks with their main financial institution for seven years or more, 0 otherwise. |
| CHANGED_BANK | 1 if the respondent has changed their main financial institution in the last 12 months, 0 otherwise. |
| *Skills and Traits*[2] | |
| MATHS_SKILLS | Mean score for skills in mathematics. |
| IT_SKILLS | Mean for skills in using information technology. |
| AVOID_NUMBERS | Mean for cognition in avoiding information involving numbers. |
| RISK_TAKING | Mean for risk-taking attitude (tendency to take risks). |
| OPTIMISM | Mean for optimism (tendency to expect more good things to happen). |
| *Source of information* | |
| ADVISE_PROFESS | 1 if the respondent seeks financial advice from professionals, 0 otherwise. |
| HIGH_SOCIAL_MEDIA | 1 if the respondent is using/accessing social media more than three hours per day, 0 otherwise. |
| TRUST_SOCIAL_MEDIA[3] | Mean score for trust in social media. |

*Notes:*

[1] On a scale of 1 to 10, where 1 means *totally disagree* and 10 means *totally agree*, to what extent do you agree or disagree with the following statement:

- "I am very competent in handling decisions pertaining to my banking affairs".

[2] On a scale of 1 to 10, where 1 means *totally disagree* and 10 means *totally agree*, to what extent do you agree or disagree with the following statements (in order of appearance in the table):

- "I am very good at maths",
- "I am very good at information technology (computers)",
- "I prefer not to pay much attention to information that includes numbers",
- "I see myself as someone who takes risks, rather than avoiding risks when making economic decision",
- "I expect more positive events to happen in my life than negative".

[3] On a scale of 1 to 10, where 1 means *totally disagree* and 10 means *totally agree*, to what extent do you agree or disagree with the following statements:

- "Social media provide very trustworthy information pertaining to economic and banking matters".

## Table 4: Patterns of responses to financial knowledge questions.

This table presents the patterns of responses to the six financial knowledge questions tabulated across female individuals, male individuals and the entire sample. Table details the context of each question.

| | Female | | Male | | Entire sample | |
|---|---|---|---|---|---|---|
| | Frequency | % | Frequency | % | Frequency | % |
| *Panel A: Distribution of answers* | | | | | | |
| Q1. Compound interest calculation | | | | | | |
| Correct | 93 | 15.5 | 159 | 26.5 | 252 | 42.00 |
| Wrong | 155 | 25.83 | 113 | 18.83 | 268 | 44.67 |
| Don't Know / Don't Answer | 53 | 8.83 | 27 | 4.50 | 80 | 13.33 |
| Q2. Understanding & consequences of inflation | | | | | | |
| Correct | 160 | 26.67 | 190 | 31.67 | 350 | 58.33 |
| Wrong | 53 | 8.83 | 45 | 7.50 | 98 | 16.33 |
| Don't Know / Don't Answer | 88 | 14.67 | 64 | 10.67 | 152 | 25.33 |
| Q3. Benefits of risk diversification | | | | | | |
| Correct | 146 | 24.33 | 158 | 26.33 | 304 | 50.67 |
| Wrong | 155 | 25.83 | 141 | 23.5 | 296 | 49.33 |
| Q4. Understanding of APR (definition) | | | | | | |
| Correct | 150 | 25 | 148 | 24.67 | 298 | 49.67 |
| Wrong | 151 | 25.17 | 151 | 25.17 | 302 | 50.33 |
| Q5. Understanding of APR (usage) | | | | | | |
| Correct | 128 | 21.33 | 127 | 21.17 | 255 | 42.5 |
| Wrong | 173 | 28.83 | 172 | 28.67 | 345 | 57.5 |
| Q6. Awareness of crucial banking issues | | | | | | |
| Correct | 145 | 24.17 | 190 | 31.67 | 335 | 55.83 |
| Wrong | 34 | 5.67 | 22 | 3.67 | 56 | 9.33 |
| Don't Know / Don't Answer | 122 | 20.33 | 87 | 14.50 | 209 | 34.83 |
| *Panel B: Distribution of correct answers* | | | | | | |
| No correct answers | 24 | 4.00 | 10 | 1.67 | 34 | 5.67 |
| One correct answer | 41 | 6.83 | 29 | 4.83 | 70 | 11.67 |
| Two correct answers | 71 | 11.83 | 56 | 9.33 | 127 | 21.17 |
| Three correct answers | 67 | 11.17 | 78 | 13.00 | 145 | 24.17 |
| Four correct answers | 62 | 10.33 | 55 | 9.17 | 117 | 19.50 |
| Five correct answers | 26 | 4.33 | 49 | 8.17 | 75 | 12.50 |
| All correct answers | 10 | 1.67 | 22 | 3.67 | 32 | 5.33 |

## Table 5: Summary statistics.

Summary statistics of the variables used in the regression analysis. Columns (1) and (2) report the mean and standard deviation (S.D.) of the variables for the entire sample. Columns (3) and (4) report the mean and standard deviation of the variables for the subsample of respondents who answered fewer than four questions correctly (perceived as being *financially illiterate* individuals), whereas columns (5) and (6) report the mean and standard deviation of the variables for the subsample of students who answered at least four questions correctly (perceived as being *financially literate* individuals). Column (7) reports the *t*-statistics testing the difference of means between columns (5) and (3) measuring the difference in means between *financially literate* vs *financially illiterate* individuals. Column (8) reports Pearson correlation coefficients of the variables with the main financial knowledge score (FK_SCORE_1). All the variables are defined in Table 4. * denotes *p*-value <0.1; ** denotes *p*<0.05; *** denotes *p*<0.01.

| | Entire sample | | Fewer than 4 correct answers | | At least 4 correct answers | | | Correlations with FK_SCORE_1 |
|---|---|---|---|---|---|---|---|---|
| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Diff. (5)-(3) | Corr. Coef. |
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| *Financial Literacy* | | | | | | | | |
| FK_SCORE_1 | 0.498 | 0.256 | 0.336 | 0.161 | 0.770 | 0.121 | 0.434*** | --- |
| FK_SCORE_2 | 0.119 | 0.433 | -0.148 | 0.273 | 0.568 | 0.234 | 0.717*** | 0.962*** |
| FK_SCORE_SELF | 6.387 | 2.378 | 6.035 | 2.508 | 6.978 | 2.012 | 0.943*** | 0.206*** |
| *Demographics* | | | | | | | | |
| GENDER | 0.498 | 0.500 | 0.460 | 0.499 | 0.563 | 0.497 | 0.102** | 0.169*** |
| MILLENNIALS | 0.385 | 0.487 | 0.428 | 0.495 | 0.313 | 0.465 | -0.116*** | -0.146*** |
| METROPOLITAN | 0.410 | 0.492 | 0.383 | 0.487 | 0.455 | 0.499 | 0.072* | 0.029 |
| URBAN | 0.785 | 0.411 | 0.769 | 0.422 | 0.813 | 0.391 | 0.044 | 0.049 |
| FINANCIAL | 0.097 | 0.296 | 0.051 | 0.219 | 0.174 | 0.380 | 0.124*** | 0.215*** |
| UNIVERSITY | 0.563 | 0.496 | 0.495 | 0.501 | 0.679 | 0.468 | 0.184*** | 0.178*** |
| BUSINESS_MAJOR | 0.160 | 0.367 | 0.109 | 0.312 | 0.246 | 0.431 | 0.137*** | 0.198*** |
| HIGH_INCOME | 0.072 | 0.258 | 0.037 | 0.190 | 0.129 | 0.336 | 0.092*** | 0.195*** |
| *Banking Activity* | | | | | | | | |
| MULTIPLE_BANKS | 0.210 | 0.408 | 0.170 | 0.376 | 0.277 | 0.448 | 0.107*** | 0.123*** |
| LONG_MAIN_BANK | 0.693 | 0.461 | 0.662 | 0.474 | 0.746 | 0.437 | 0.083** | 0.134*** |
| CHANGED_BANK | 0.157 | 0.364 | 0.170 | 0.376 | 0.134 | 0.341 | -0.036 | -0.036 |
| *Skills and Traits* | | | | | | | | |
| MATHS_SKILLS | 7.107 | 2.226 | 6.649 | 2.321 | 7.875 | 1.820 | 1.226*** | 0.275*** |
| IT_SKILLS | 6.783 | 2.630 | 6.566 | 2.793 | 7.147 | 2.291 | 0.581*** | 0.128*** |
| AVOID_NUMBERS | 5.032 | 2.974 | 5.045 | 2.974 | 5.009 | 2.981 | -0.036 | -0.054 |
| RISK_TAKING | 4.737 | 2.784 | 4.662 | 2.865 | 4.862 | 2.644 | 0.199 | 0.017 |
| OPTIMISM | 7.778 | 2.156 | 7.777 | 2.239 | 7.781 | 2.014 | 0.005 | -0.029 |
| *Other* | | | | | | | | |
| ADVISE_PROFESS | 0.080 | 0.272 | 0.066 | 0.249 | 0.103 | 0.304 | 0.036 | 0.081** |
| HIGH_SOCIAL_MEDIA | 0.145 | 0.352 | 0.157 | 0.364 | 0.125 | 0.331 | -0.032 | -0.083** |
| TRUST_SOCIAL_MEDIA | 4.530 | 2.913 | 4.705 | 2.961 | 4.237 | 2.813 | -0.468* | -0.106*** |

## Table 6: Determinants of financial literacy.

OLS regression results of factors influencing respondents' level of financial literacy. The dependent variable in models (1) and (2) is the mean score from the respondents' responses to questions of Table 1, wherein each correct answer takes a score of 1, while all other answers take a score of 0. The dependent variables in models (3) and (4) is the mean score from the respondents' responses, wherein each correct answer takes a score of 1, each wrong answer takes a score of -1 and responses of "Don't Know / Don't Answer" take a score of 0. A constant term is always included in the regressions. All the variables are defined in Table 3. Standard errors are displayed in parentheses. VIF diagnostics reveal no evidence for multicollinearity (all VIFs < 1.500). * denotes *p*-value <0.1; ** denotes *p*<0.05; *** denotes *p*<0.01.

| | FK_SCORE_1 | | FK_SCORE_2 | |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| FK_SCORE_SELF | 0.084** | 0.082** | 0.071* | 0.070* |
| | (0.040) | (0.040) | (0.039) | (0.040) |
| GENDER | 0.252*** | 0.237*** | 0.215*** | 0.205*** |
| | (0.075) | (0.076) | (0.077) | (0.078) |
| MILLENNIALS | -0.485*** | -0.478*** | -0.421*** | -0.451*** |
| | (0.085) | (0.097) | (0.087) | (0.100) |
| METROPOLITAN | | -0.105 | | -0.113 |
| | | (0.081) | | (0.083) |
| URBAN | | 0.001 | | -0.031 |
| | | (0.094) | | (0.099) |
| FINANCIAL | | 0.432*** | | 0.468*** |
| | | (0.127) | | (0.132) |
| UNIVERSITY | 0.318*** | 0.322*** | 0.279*** | 0.307*** |
| | (0.090) | (0.093) | (0.091) | (0.094) |
| BUSINESS_MAJOR | 0.314*** | 0.136 | 0.297*** | 0.118 |
| | (0.107) | (0.117) | (0.111) | (0.119) |
| HIGH_INCOME | 0.332** | 0.274** | 0.259* | 0.211 |
| | (0.137) | (0.131) | (0.155) | (0.149) |
| MULTIPLE_BANKS | | 0.141* | | 0.088 |
| | | (0.083) | | (0.088) |
| LONG_MAIN_BANK | | 0.167* | | 0.079 |
| | | (0.085) | | (0.087) |
| CHANGED_BANK | | -0.087 | | -0.087 |
| | | (0.098) | | (0.102) |
| MATHS_SKILLS | 0.166*** | 0.148*** | 0.151*** | 0.136*** |
| | (0.039) | (0.039) | (0.039) | (0.040) |
| IT_SKILLS | | 0.045 | | 0.021 |
| | | (0.045) | | (0.046) |
| AVOID_NUMBERS | -0.050 | -0.043 | -0.054 | -0.047 |
| | (0.043) | (0.042) | (0.043) | (0.043) |
| ADVISE_PROFESS | | 0.212 | | 0.226 |
| | | (0.132) | | (0.139) |
| HIGH_SOCIAL_MEDIA | | -0.066 | | -0.004 |
| | | (0.116) | | (0.121) |
| Rsq | 0.189 | 0.223 | 0.147 | 0.175 |

## Table 7: Usage of banking services.

OLS and logistic regression results of factors influencing respondents' preferences for receiving banking services (visit to branch or i-banking service). Panel A reports the frequencies of respondents' preferences and Panel B reports the regression results. Models (1) and (3) report OLS regression results, whereby the dependent variable takes values between 1 and 5. Models (2) and (4) report logistic regression results, whereby the dependent variable takes the value of 1 when the respondent has answered "Rarely (or never)" as per Panel A, and 0 otherwise. The definitions for independent variables appear in Table 3. A constant term is included in the regressions. Standard errors are displayed in parentheses. All continuous variables are z-score standardized (mean value of zero and standard deviation of one). VIF diagnostics reveal no evidence for multicollinearity (all VIFs < 1.500). * denotes *p*-value <0.1; ** denotes *p*<0.05; *** denotes *p*<0.01.

Panel A

Question: How often are you using the following banking services within a month:

| | Visit to the branch (VISIT) | i-banking usage (ONLINE) |
|---|---|---|
| 1 = Rarely (or never) | 65.00 (VISIT_RARE = 1) | 33.83 (ONLINE_RARE = 1) |
| 2 = Few times | 24.67 | 22.17 |
| 3 = Often | 4.83 | 17.83 |
| 4 = Very often | 4.17 | 22.67 |
| 5 = Almost every day | 1.33 | 3.50 |

Panel B

| | VISIT (1) | VISIT_RARE (2) | ONLINE (3) | ONLINE_RARE (4) |
|---|---|---|---|---|
| FK_SCORE_1 | -0.116*** | 0.160* | 0.092** | -0.497*** |
| | (0.043) | (0.093) | (0.037) | (0.117) |
| GENDER | -0.035 | -0.086 | -0.113 | 0.240 |
| | (0.081) | (0.182) | (0.071) | (0.218) |
| MILLENNIALS | -0.166* | 0.635*** | 0.370*** | -1.258*** |
| | (0.088) | (0.195) | (0.093) | (0.289) |
| METROPOLITAN | -0.123 | 0.284 | -0.020 | -0.160 |
| | (0.085) | (0.191) | (0.079) | (0.228) |
| URBAN | -0.107 | 0.152 | 0.201** | -0.487* |
| | (0.114) | (0.224) | (0.088) | (0.269) |
| MULTIPLE_BANKS | 0.320*** | -0.636*** | 0.114 | -0.554* |
| | (0.107) | (0.214) | (0.082) | (0.283) |
| LONG_MAIN_BANK | -0.037 | -0.019 | -0.074 | -0.145 |
| | (0.099) | (0.207) | (0.080) | (0.250) |
| CHANGED_BANK | 0.210* | -0.413* | -0.039 | 0.264 |
| | (0.126) | (0.242) | (0.097) | (0.296) |
| IT_SKILLS | | | 0.351*** | -0.896*** |
| | | | (0.043) | (0.125) |
| AVOID_NUMBERS | | | -0.057 | 0.189* |
| | | | (0.040) | (0.114) |
| RISK_TAKING | 0.100** | -0.108 | 0.093** | -0.240** |
| | (0.049) | (0.091) | (0.038) | (0.112) |
| OPTIMISM | 0.080* | -0.159* | -0.083** | 0.115 |
| | (0.044) | (0.092) | (0.038) | (0.109) |
| HIGH_SOCIAL_MEDIA | | | 0.014 | -0.313 |
| | | | (0.110) | (0.402) |
| TRUST_SOCIAL_MEDIA | | | 0.057 | -0.088 |
| | | | (0.040) | (0.114) |
| Rsq / -2LogL | 0.071 | 739.020 | 0.270 | 561.791 |

## Table 8: Reasons for using i-banking rarely (or never).

Summary statistics for reasons that respondents are using the i-banking rarely (or never). Panel A reports the distribution of agreement with four statements taking a score ranging from 1 (indicating that the respondent *totally disagrees* with the statement) to 10 (indicating that the respondent *totally agrees* with the statement). The top part of Panel B reports the distribution of observations that fall in each category. The information in the bottom part of Panel B is as follows: Columns (1) and (2) report the mean and standard deviation (S.D.) of the statements' score for the entire sample. Columns (3) and (4) report the mean and standard deviation of the statements' score for the subsample of respondents who answered fewer than four questions correctly (perceived as being *financially illiterate* individuals), whereas columns (5) and (6) report the mean and standard deviation of the statements' score for the subsample of respondents who answered at least four questions correctly (perceived as being *financially literate* individuals). Column (7) reports the t-statistics testing the difference of means between columns (5) and (3) measuring the difference in means between financially literate vs financially illiterate individuals. * denotes p-value <0.1; ** denotes p<0.05; *** denotes p<0.01.

Panel A

Question: On a scale of 1 to 10, where 1 means *totally disagree* and 10 means *totally agree*, to what extent do you agree or disagree with the following statements?

| | Level of agreement (score) | | | |
|---|---|---|---|---|
| *Statement* | Totally Disagree (score = 1) | (score = 2 to 9) | Totally Agree (score = 10) | Don't answer |
| I don't trust i-banking | 26.60 | 32.50 | 35.47 | 5.42 |
| I don't have the necessary IT skills | 28.08 | 27.60 | 42.36 | 1.96 |
| I don't have the necessary banking knowledge | 24.63 | 32.52 | 40.39 | 2.46 |
| I want to have personal contact with bank officer | 10.34 | 27.10 | 61.08 | 1.48 |

Panel B

| | Entire sample | Fewer than 4 correct answers (financially illiterate) | At least 4 correct answers (financially literate) |
|---|---|---|---|
| | Number of observations with a score | | |
| *Statement* | | | |
| I don't trust i-banking | 192 | 136 | 56 |
| I don't have the necessary IT skills | 199 | 143 | 56 |
| I don't have the necessary banking knowledge | 198 | 142 | 56 |
| I want to have personal contact with bank officer | 200 | 144 | 56 |

| | Mean | S.D. | Mean | S.D. | Mean | S.D. | Diff. (5)-(3) |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| *Statement* | | | | | | | |
| Don't trust i-banking | 5.958 | 3.838 | 6.309 | 3.743 | 5.107 | 3.967 | -1.202** |
| Don't have the necessary IT skills | 6.246 | 3.897 | 6.853 | 3.726 | 4.696 | 3.926 | -2.157*** |
| Don't have the necessary banking knowledge | 6.394 | 3.741 | 7.077 | 3.423 | 4.661 | 3.978 | -2.417*** |
| Want to have personal contact with bank officer | 8.165 | 2.974 | 8.313 | 2.854 | 7.786 | 3.257 | -0.527 |

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